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GREENHOUSE TOMATO BREEDING SUMMARY AND FALL CROP 1984 EVALUATION TRIALS, WOOSTER

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Greenhouse Tomato Breeding Summary and Fall Crop 1984 Evaluation Trial, Wooster

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Ohio is the largest producer of greenhouse tomatoes in the United States. About one-third of the total U.S. greenhouse tomato acreage is in Ohio. High costs of energy and labor, plus increased competition from the domestic winter fresh market industry and foreign imports are major problems facing the industry. Continued development of improved cultivars with greater productivity and quality is essential if the industry is to remain competitive. Improved fruit setting ability is being sought in the breeding program through utilization of conventional temperature stress tolerant material, as well as by utilization of the parthenocarpic trait.

Resistance to the several diseases which are widespread in greenhouse culture is an important consideration in greenhouse tomato development and evaluation. This includes resistance to Tobacco Mosaic Virus (TMV), Fusarium Crown and Root Rot (FCRR), Fusarium Wilt Race 1, Fusarium Wilt Race 2, Verticillium and Nematodes. Most recently a new race of Verticillium has begun to appear and resistant lines are being developed. Bacterial canker is a constant threat and lines with resistance to this disease are also being developed in addition to Cladosporium leafmold resistance.

Materials and Methods

Nine pink-fruited greenhouse tomato cultivars and experimental lines and hybrids were evaluated in replicated trial in the 1984 fall crop at Wooster.

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CULTIVAR DESCRIPTIONS

Cultivar or Line	Hybrid[1] or Inbred	Major Descriptions[2] TMV (Tm2^2)	Fusarium Crown & Root Rot (FCRR)	Fusarium Race 1 (I-1)	Fusarium Race 2 (I-2)	Verticillium Race 1 (Ve)	Root Knot Nematode (M.incognita) (Mi)
Ohio CR6	H	R	R	R	S	R	S
Ohio MR13	I	R	S	R	S	S	S
DeRuiter 864	H	R	R	R	R	R	S
OARDC 841	I	R	R	R	S	R	S
OARDCES 2089	H	R	R	R	S	R	S
OARDCF 1489	H	R	R	R	Seg	Seg	R
OARDCO 1497	H	R	R	R	R	R	R
OARDCO 1492	H	R	R	R	R	R	R
OARDCO 1297	H	R	R	R	S	R	S

[1]H = Hybrid
I = Inbred

[2]R = Resistant
S = Susceptible
Seg= Segregating

Seed was sown June 15, 1984. Seedlings were transplanted into 4" plastic pots June 28 and plants set into steam sterilized ground beds on August 1. Rows were spaced 36" apart with plants 18" in the row and 6 plants per single row. The trial had 9 entries in 4 replications. When the transplants were set into the ground beds a starter solution of 6 lb. per 100 gal. 10-52-8 was applied at the rate of 1/2 pint per plant. A peanut hull mulch was used. Cultural practices during the growing season were standard. The plants were pollinated by vibrating the plants with an electric vibrator. Temperatures were 70^{o}-75^{o}F during the day and 62^{o}F night. Watering was done with overhead irrigation. The first harvest was made on October 1 and the last on December 17. The crop was topped October 22.

Yield, fruit size and several fruit quality characteristics for the 1984 fall crop are summarized in Table 1. The results indicate that some of the more recently developed multiple disease resistant lines have good earliness, productivity, fruit size and quality. Average fruit yield per plant and fruit size of the hybrids was greater than that of either of the inbred cultivars Ohio MR13 or O 841. There has been interest in utilizing multiple disease resistant inbreds such as O 841 for production to avoid the high cost of hybrid seed. In this trial the inbred had limited productivity and unsatisfactory fruit size. The facility by which the several disease resistances controlled by single dominant genes can be rapidly utilized when fixed in only one of the two parents of a hybrid is a distinct advantage in hybrid cultivar development; this advantage in conjunction with the superior performance of hybrids such as reported on herein, give little promise for use of inbred greenhouse tomato cultivars.

In regard to hybrid cultivar performance, as reported herein, of particular note is the new experimental hybrid cultivar O 1497, which, in addition to TMV^2, FCRR and Fusarium Race 1 resistance, also possesses Fusarium Race 2, Verticillium Race 1, and nematode resistance. It compared favorably with O 1489, which is already in semicommercial trial. It is to be noted that O 1497 is completely resistant to Fusarium Race 2 and Verticillium Race 1 and thus, has more potential than O 1489, which is segregating for resistance to those two diseases. O 1497 is also being extensively tested in Ohio and Canadian commercial ranges. Zippering, epidermal scars caused by adnate anthers, has been a problem with nematode resistant lines. However, in this trial it was found to be of minor occurence in O 1497 and it is to be noted that it occurred somewhat more frequently in O 1489. Fruit cracking and blossom end rot were also significantly less in occurrence in O 1497 than O 1489.

Hybrid O F1489 and O 1497 continue to exhibit promising performance. Spring 1985 crop evaluation trials at OARDC, Wooster and extensive commercial range trials in Ohio and Canada are in progress and should provide more complete information on the potential of these hybrids.

Seed Sources

1. The Ohio State University, OARDC, Wooster, OH
2. Bruinsma Seeds BV, PO Box 24, 2670AA Naaldwijk, Holland
3. DeRuiter Seeds, Inc., PO Box 20228, Columbus, OH

TABLE 1. Evaluation of Greenhouse Tomato Cultivars and Experimental Lines, Fall Crop, 1984, Wooster. OH.

	Early Harvest*			Total Harvest						
Cultivar	Fruit Wt/ plant (lb)	Fruit Size (oz.)	Percent No. 1 Fruit	Fruit Wt./ plant (lb.)	Fruit Size (oz.)	Percent No. 2 fruit	% Fruit Off Shape	% Fruit Cracking	% Blossom end rot	% Zippers
Ohio CR-6	2.9	4.6	60	10.5	4.6	68	2	8	3	3
OARDC F1489	4.0	4.8	60	10.4	4.6	57	4	11	6	7
OARDC ES2089	3.8	4.6	50	10.2	4.3	55	4	11	8	3
OARDC O1497	4.1	4.6	74	10.2	4.3	69	3	6	1	4
DeRuiter 864	3.5	5.8	47	9.9	5.1	51	3	23	1	2
OARDC O1492	3.8	4.8	69	9.4	4.5	67	3	5	2	5
OARDC O1297	2.5	4.2	67	8.8	4.2	70	2	5	3	1
OARDC O841	1.8	3.5	77	8.3	3.5	76	2	3	2	1
Ohio MR13	2.7	4.0	36	7.9	4.0	53	2	25	4	8
LSD .05	0.6	0.5	12	NS	0.3	8	NS	4	3	3

*Early Harvest-First 4 harvests, October 1 to November 1.

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